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2. (newly added) The method of claim 1, wherein the step of performing natural language analysis includes analyzing a semantic content of the recognized words.

3. (newly added) The method of claim 1, wherein the step of performing natural language analysis includes judging that a plurality of possible recognized words are synonyms.

4. (newly added) The method of claim 1, wherein the step of performing natural language analysis includes accepting synonyms for the recognized words.

5. (newly added) The method of claim 1, wherein the step of performing natural language analysis includes analyzing a grammatical structure of the recognized words.

6. (newly added) The method of claim 1, wherein the step of displaying a picture includes displaying a picture having a plurality of elements, and wherein the step of performing natural language analysis includes altering a visual characteristic of at least one of the elements in response to the input speech response.

7. (newly added) The method of claim 1, wherein the step of displaying a picture includes displaying a picture having a plurality of elements, and wherein the step of performing natural language analysis includes colorizing at least one of the elements in response to the input speech response.

8. (newly added) The method of claim 1, wherein the step of displaying a picture includes displaying a picture having a plurality of elements, and wherein the step of performing natural language analysis includes de-colorizing at least one of the elements in response to the input speech response.

9. (newly added) The method of claim 1, further comprising the step of replaying the speech response.

10. (newly added) The method of claim 1, wherein the step of generating a speech prompt includes providing an auditory cue to the user that is activated by interacting with an icon.

11. (newly added) The method of claim 1, wherein the step of generating a speech prompt includes providing an auditory cue for one of a verb and a preposition to the user that is activated by interacting with an icon.

12. (newly added) A system for conducting speech therapy by having a patient describe a picture, the system comprising:

a visual display device for displaying the picture;

a microphone adapted to capture sounds spoken by the patient to describe the picture;

a speaker adapted to output sound in response to the sounds spoken by the patient;

a processor coupled to drive the visual display device and the speaker and to receive the sounds from the microphone, the processor being programmed to:

display the picture;

generate a speech prompt for information describing the picture;

input a speech response;

perform speech recognition on the input speech response to recognize words comprising the response; and

perform natural language analysis of the recognized words to determine whether the response accurately describes the picture.

13. (newly added) The system of claim 12, wherein the processor is programmed to perform natural language analysis including analyzing a semantic content of the recognized words.

14. (newly added) The system of claim 12, wherein the processor is programmed to perform natural language analysis including judging that a plurality of possible recognized words are synonyms.

15. (newly added) The system of claim 12, wherein the processor is programmed to perform natural language analysis including accepting synonyms for the recognized words.

16. (newly added) The system of claim 12, wherein the processor is programmed to perform natural language analysis including analyzing a grammatical structure of the recognized words.

17. (newly added) The system of claim 12, wherein the processor is programmed to display a picture having a plurality of elements, and to perform natural language analysis

including altering a visual characteristic of at least one of the elements in response to the input speech response.

18. (newly added) The system of claim 12, wherein the processor is programmed to display a picture having a plurality of elements, and to perform natural language analysis including colorizing at least one of the elements in response to the input speech response.

19. (newly added) The system of claim 12, wherein the processor is programmed to display a picture having a plurality of elements, and to perform natural language analysis including de-colorizing at least one of the elements in response to the input speech response.

20. (newly added) The system of claim 12, wherein the processor is programmed to generate a speech prompt that provides an auditory cue to the user that is activated by interacting with an icon.

REMARKS

Claim 1 is currently pending and stands rejected. Entry of new claims 2-20 is requested in this amendment.

The applicants respond herein to the substantive paragraphs of the Official Action mailed on 20 October 1999. Paragraph 1 of the Official Action objected to the disclosure because of an informality appearing on page 6, line 27 of the specification. That informality has been corrected.

Paragraphs 2 and 3 of the Official Action rejected claim 1 under § 103(a) as being unpatentable over Wen. In response, the applicants respectfully traverse the rejection of claim 1 because the step of "performing natural language analysis of the recognized words to determine whether the response accurately describes the picture", as fairly interpreted in light of the applicants' disclosure, is not rendered obvious by the "PATTERN COMPARATOR" component (10) taught by Wen.

Speech recognition focuses on analysis of physical parameters associated with a waveform representing the speech using, for example, time or frequency domain analysis. A waveform representing an input sound is analyzed and compared to a plurality of stored waveforms, each of which correspond to a given word or group of words. If the input sound

waveform matches closely enough to one of the stored waveforms, the speech recognizer outputs the word(s) corresponding to that one stored waveform. The speech recognizer essentially maps sound into corresponding text or word representation.

The applicants' disclosure describes in several places the meaning of "natural language" understanding and analysis, as contrasted with "speech recognition." On page 3, lines 14-19, the specification discusses the advantages of performing natural language understanding in addition to speech recognition. Specifically, natural language understanding analyses the grammatical structure of a group of words to determine the semantic meaning of that group of words. By definition, synonymous words or phrases have the same or similar semantic meaning. The ability to determine that different phrases or groups of words have the same semantic meaning, through semantic analysis via natural language understanding, enables the invention to recognize synonyms without having to store duplicative waveforms for comparison. See, e.g., page 3, lines 15-20; page 5, lines 20-25; and page 6, lines 20-25 of the specification.

Additionally, natural language understanding not only allows the use of synonyms, it also allows the use of different grammatical structures: the system will accept both "The truck is following the nurse" and "The nurse is being followed by the truck" (but not "The nurse is following the truck"). See, e.g., page 6, lines 25-26 of the specification. Given the advances in speech recognition technology, natural language understanding can increasingly analyze and accommodate a wide variety of syntactic structures and expected responses (e.g., a module in which the patient and the computer interact in a simulated dialogue to practice ordering in a restaurant). A speech recognition-type system programmed with one or more target waveforms would generally lack the flexibility and adaptability to handle such open-ended responses.

Note that time and frequency domain analysis is irrelevant to natural language understanding, while such analysis is critical to speech recognition. Speech recognition converts waveforms into groups of words; natural language understanding proceeds one step further by converting those groups of words into abstract meaning.

Finally, natural language understanding provides feedback to the user at levels of specificity that cannot be matched by word-level speech recognition by allowing the system to point out to the user that they left out some specific piece of information, not just that their

response didn't match. For example, the system and method of the invention can convey this information to the user by providing verbal cues to focus the user on a specific aspect of the picture, or by altering some visual characteristic of an element of the picture displayed to the user. This function is described at page 6, line 15 through page 7, line 4 of the specification. In this example, the system colorizes those elements of the picture that the user correctly describes, while leaving the rest of the elements de-colorized. This way, the user can then focus subsequent effort on the de-colorized elements. New method claims 6-8 and system claims 17-19 recite this feature of the invention, and are supported by the portion of the specification cited above.

In light of the meaning of "natural language understanding" established by the applicants' disclosure, the "PATTERN COMPARATOR" component (10) as taught by Wen does not fairly render obvious the invention as recited in claim 1. Wen appears to teach a "PATTERN COMPARATOR" component (10) that is concerned with frequency analysis (column 5, lines 20-30; column 7, lines 15-25; column 8, lines 1-6), and does not address semantic or grammatical analysis, which is essential to "natural language understanding" as recited in claim 1. As noted above, frequency analysis is irrelevant to natural language understanding.

The applicants submit that claim 1 as understood in light of the disclosure is not rendered obvious by Wen. However, the applicants have inserted additional claims to recite various features of the invention. Each of these new claims is believed supported by the specification as originally filed. Specifically, claim 2 is supported at least by page 6, line 21; claim 3 by page 6, line 22; claim 4 at least by page 5, line 23; and claim 5 at least by page 3, lines 14-19. Claim 9 is supported at least by page 7, lines 6-7. Claims 10, 11, and 20 are supported at least by page 3, line 4 and page 5, line 12. New system claims 12-19 are supported at least by Fig. 1 and the corresponding description, and by the sections cited as support for new claims 2-5.

The applicants submit that all claims pending in the case are allowable over the cited art. The examiner is requested to contact the undersigned with any comments or suggestions for placing this application in even better condition for allowance.

The applicants enclose herewith a petition for a 2-month extension of time.

Respectfully submitted,

Date: 20 May, 2000



Signature

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